

Exporting Hydropower

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Hydropower Exports, Market?

Continents

- ❖ Asia (59%)
- ❖ Africa (20%)
- ❖ South America (14%)
- ❖ North & Central America (5%)
- ❖ Europe (2%)

Planned Hydropower

- ❖ 302,000 MW
- ❖ 44,000 MW
- ❖ 65,000 MW
- ❖ 19,000 MW
- ❖ 13,000 MW

❖ Total

❖ 443,000 MW

2006-2007 Reported Data; Multiple Sources; Numbers Rounded to Nearest 1,000.

Select Countries

- ❖ Cambodia
- ❖ China
- ❖ India
- ❖ Indonesia
- ❖ Myanmar
- ❖ Pakistan
- ❖ Russia
- ❖ Tajikistan
- ❖ Thailand
- ❖ Turkey
- ❖ Vietnam

Planned Hydropower

- ❖ 7,700 MW
- ❖ 80,000 MW
- ❖ 55,000 MW
- ❖ 3,200 MW
- ❖ 8,000 MW
- ❖ 22,600 MW
- ❖ 8,200 MW
- ❖ 27,000 MW
- ❖ 4,000 MW
- ❖ 20,000 MW
- ❖ 3,800 MW

Note: Less than 25% of Economically Feasible Hydropower Developed. 3

Africa

Select Countries

- ❖ Angola
- ❖ Congo (DR)
- ❖ Ethiopia
- ❖ Mozambique
- ❖ Nigeria
- ❖ Tanzania
- ❖ Zambia

Planned Hydropower

- ❖ 16,000 MW
- ❖ 43,000 MW
- ❖ 4,200 MW
- ❖ 3,900 MW
- ❖ 4,800 MW
- ❖ 2,100 MW
- ❖ 1,300 MW

Note : Less Than 4% of Economically Feasible Hydropower Developed.

South America

Select Countries

- ❖ Argentina
- ❖ Brazil
- ❖ Chile
- ❖ Columbia
- ❖ Paraguay
- ❖ Peru
- ❖ Surinam
- ❖ Venezuela

Planned Hydropower

- ❖ 9,000 MW
- ❖ 34,000 MW
- ❖ 3,000 MW
- ❖ 10,000 MW
- ❖ 2,300 MW
- ❖ 1,500 MW
- ❖ 2,200 MW
- ❖ 3,600 MW

Note : Less Than 40% of Economically Feasible Hydropower Developed.

North & Central America

Select Countries

- ❖ Canada
- ❖ Costa Rica
- ❖ Guatemala
- ❖ Mexico
- ❖ Nicaragua

Planned Hydropower

- ❖ 8,000 MW
- ❖ 1,000 MW
- ❖ 2,400 MW
- ❖ 4,000 MW
- ❖ 1,800 MW

Note : Less Than 70% of Economically Feasible Hydropower Developed.

Europe

Select Countries

- ❖ Austria
- ❖ Italy
- ❖ Norway
- ❖ Serbia
- ❖ Sweden

Planned Hydropower

- ❖ 1,000 MW
- ❖ 2,100 MW
- ❖ 900 MW
- ❖ 1,300 MW
- ❖ 2,200 MW

Note : Less Than 75% of Economically Feasible Hydropower Developed.

Hydropower Potential Exports, Total Capital Cost

<u>Continents</u>	<u>Million US \$\$</u>
❖ Asia (59%)	❖ \$604,360
❖ Africa (20%)	❖ \$87,568
❖ South America (14%)	❖ \$129,894
❖ North & Central America (5%)	❖ \$38,422
❖ Europe (2%)	❖ \$25,770
❖ Total	❖ \$886,214

2006-2007 Reported Data; Multiple Sources; Numbers Rounded to Nearest 1,000.

Hydropower Potential Exports, Developer/Owner

<u>Continents</u>	<u>Million US \$\$</u>
❖ Asia (59%)	❖ \$30,218
❖ Africa (20%)	❖ \$4,378
❖ South America (14%)	❖ \$6,495
❖ North & Central America (5%)	❖ \$1,921
❖ Europe (2%)	❖ \$1,289
<hr/>	
❖ Total	❖ \$44,311

2006-2007 Reported Data; Multiple Sources; Numbers Rounded to Nearest 1,000. Owner Cost average 5% of Capital Costs.

Hydropower Potential Exports, Services

<u>Continents</u>	<u>Million US \$\$</u>
❖ Asia (59%)	❖ \$48,348
❖ Africa (20%)	❖ \$7,005
❖ South America (14%)	❖ \$10,392
❖ North & Central America (5%)	❖ \$3,074
❖ Europe (2%)	❖ \$2,062
❖ Total	❖ \$70,897

2006-2007 Reported Data; Multiple Sources; Numbers Rounded to Nearest 1,000. Engineer & Scientific Services Average 8% of Capital Cost

Hydropower Potential Exports, Equipment

<u>Continents</u>	<u>Million US \$\$</u>
❖ Asia (59%)	❖ \$151,090
❖ Africa (20%)	❖ \$21,892
❖ South America (14%)	❖ \$32,474
❖ North & Central America (5%)	❖ \$9,606
❖ Europe (2%)	❖ \$6,442
❖ Total	❖ \$221,554

2006-2007 Reported Data; Multiple Sources; Numbers Rounded to Nearest 1,000. Equipment Cost average 25% of Capital Cost.

Hydropower Potential Exports, Construction

<u>Continents</u>	<u>Million US \$\$</u>
❖ Asia (59%)	❖ \$374,703
❖ Africa (20%)	❖ \$54,292
❖ South America (14%)	❖ \$80,534
❖ North & Central America (5%)	❖ \$23,822
❖ Europe (2%)	❖ \$15,977
❖ Total	❖ \$549,452

2006-2007 Reported Data; Multiple Sources; Numbers Rounded to Nearest 1,000. Construction Cost averages 62% of Capital Cost.

Hydropower Exports, Why?

- ❖ Clean Technology in Multiple Industries.
- ❖ US Expertise & Technology Respected.
- ❖ Multiple Manufacturers Can Participate.
 - ◆ Hydroelectric Equipment
 - ◆ Balance-of-Plant Equipment
 - ◆ Transmission Equipment
 - ◆ Control Equipment
 - ◆ Construction Equipment
 - ◆ Operations and Maintenance Equipment

Hydropower Exports, Why?

- ❖ Multiple Contractors Can Participate
- ❖ Significant US Revenue Potential
 - ◆ Every Exported MW, Yields Taxable US Revenue.
- ❖ Significant Employment
 - ◆ Every Exported MW, Estimated Yield 2 to 8 Full Time Jobs.
- ❖ Other Renewable Alternates Similar!

Establish a Vision



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Stay on the Rails! Don't Deviate

Get Your Export Target Right!

- ❖ Choose Countries Carefully
- ❖ Get Use to Saying "No"
- ❖ If It Doesn't Make Business Sense, Say "No"
- ❖ If You Smell Corruption, Say "No"
- ❖ Do Due Diligence Before Saying "Yes"
- ❖ Compete on Value, Not Price
- ❖ Low Price; Often Not Good Value
- ❖ Many Rabbits



US Competition

- ❖ Chinese
- ❖ Korean
- ❖ German
- ❖ French
- ❖ Brazil
- ❖ Norwegian
- ❖ India
- ❖ Other

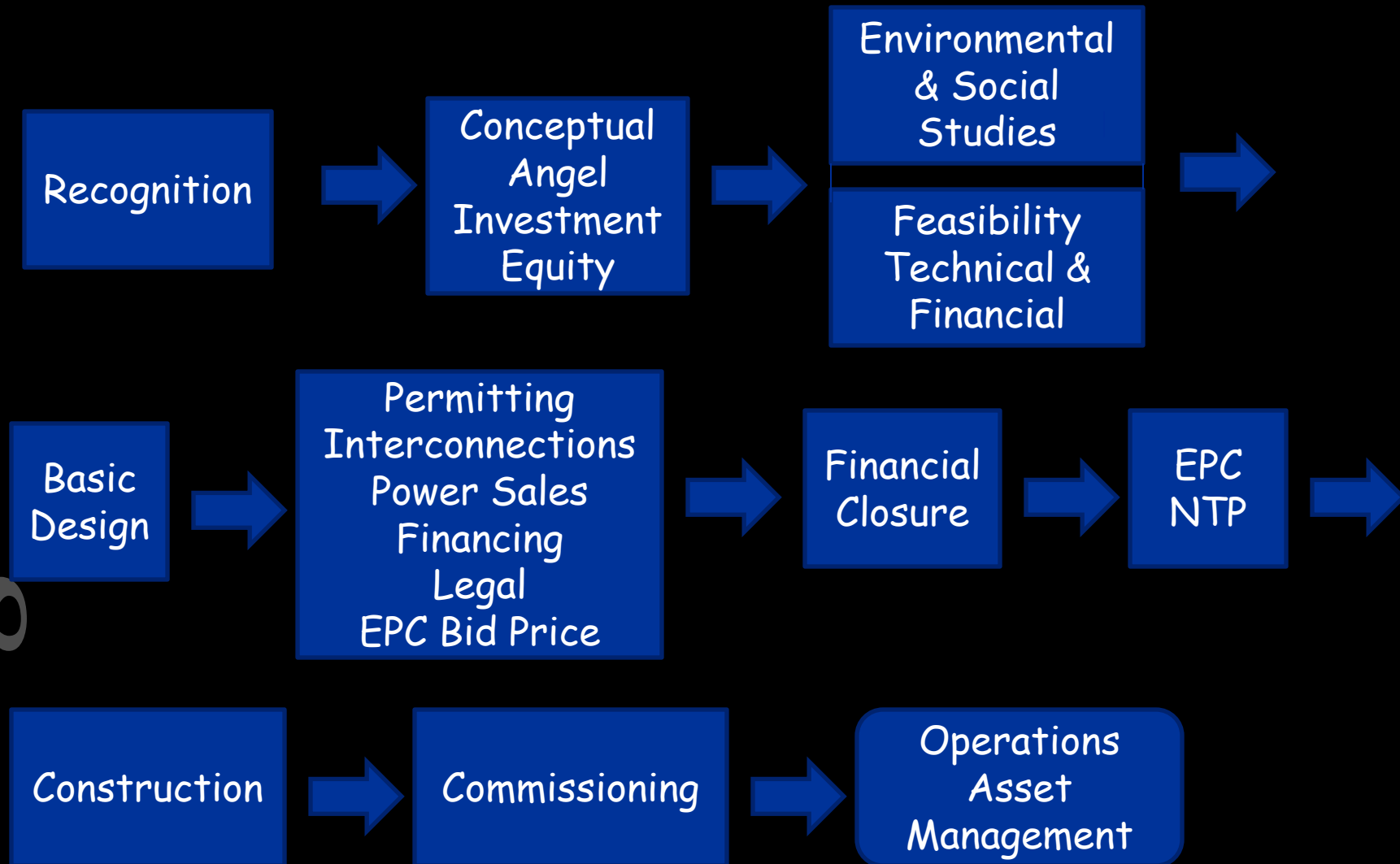


Hint: Consider Multi-National Partnerships & Joint Ventures.

Some Common Export Issues

- ❖ Price
- ❖ Contract Terms
- ❖ Delivery
- ❖ Payment
- ❖ Claims & Process
- ❖ Culture
- ❖ Taxes, Hidden Taxes
- ❖ Shipment Damage
- ❖ Receiving Damage
- ❖ Political Issues
- ❖ Corruption
- ❖ Unfair Trade Practices
- ❖ Temporary Storage
- ❖ Repair
- ❖ Warranty
- ❖ Insurance
- ❖ Force Majeure
- ❖ Work Visas
- ❖ Site & Personnel Security
- ❖ Other

Know Renewable Project Development Cycle



How to Obtain International Hydro Work?

- ❖ The Early Bird Usually Gets the Worm; Do the Country Resource Studies!
- ❖ The Early Bird Must be Patient until the Worm is Ready. Timid Worms.
- ❖ Sometime Only $\frac{1}{4}$ or $\frac{1}{2}$ of a Worm is Available.
- ❖ Local Companies Must Participate. Can't be Typical "American" and Want to do it All.
- ❖ Don't Go Alone! You Need a Government Partner.
- ❖ Be Wary of Local Brokers & Individuals Looking for Commissions & Broker Fees.

What Would Increase Hydropower Exports?

- ❖ Norwegian Countries Pay for Country Resource, Concept and Feasibility Studies. USA Should Increase This Practice.
- ❖ US Grant/Loan Terms Must be Better or on Par with China. We Beat China & India on Value; Not Rates.
- ❖ US Government Must Share Opportunity, Country & Political Business Risk.
- ❖ US Government Provides Grants for US Companies to Market & Develop Non-US Business Enterprises.
- ❖ US Government Needs to Gather and Share Business Intelligence with US Companies. China Does. Other Countries Also.

How Does USA Secure Our Share?

- ❖ Recognize the project Development Cycle?
- ❖ Seek to do the Country Resource Studies.
- ❖ Seek to do the Concept Studies.
- ❖ Seek to do the Feasibility Studies.
- ❖ Must Provide Access to Angel Equity Capital for the Concept and Feasibility Studies Through Aggressive Grants and Low Interest Loans.
- ❖ Provide Access to Flexible, Aggressive Long Term Financing at Low Interest; Long Repayment Periods; Forgiveness/Grace Periods During Project Construction

Forgotten Markets With Power Needs

- ❖ Western Africa
- ❖ Sub-Saharan Africa
- ❖ Central American
- ❖ Southeast Asian
- ❖ The "Stans"

Providing reliable power and potable water improves country political and economic stability.

Conclusion

- ❖ Market Segment is Very Large.
- ❖ Consider Forgotten Markets.
- ❖ US Could Increase its Hydropower Exports Significantly with Increased Industry Partnering and Directed US Government Supports & Incentives.
- ❖ It is Necessary to Rethink US Project Delivery Mechanisms as our Competitors are Well Organized and Government Supported.
- ❖ Hydropower Exports can Generate Significant US Tax Revenue and US Jobs.

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